TECHNICAL INFORMATION

General

Kootenai County is in the northern panhandle of Idaho. Spokane County, Washington forms the western border of the county, Bonner County, Idaho the northern, Shoshone County the eastern, and Benewah County the southern. The county's topography is scenic and varied rising from alluvial filled valleys into steep mountainous terrain in the north and east. The Selkirk Mountains rise to 5000 feet in the northwest portion of the county. Some portions of the forested, mountainous terrain in the eastern half of the county rises to 6000 feet. The rising terrain in the northern, eastern and western portions of the county is particularly hazardous for wildfires. These areas are difficult to reach with fire fighting apparatus and can create fires with serious drafts that can carry uphill quickly.

Kootenai County's population and housing are rapidly growing. The 2000 census places the population of the county at 108,685 up from 69,795 in 1990, a 56% increase. Likewise, the number of households increased from 26,942 in 1990 to 41,308 in 2000, an increase of 53% (U. S. Census Bureau 2000). The population figures exceed those expected by the Kootenai County Planning Department which, in 1995, forecasted the 2000 population to be 102,000 (Kootenai County Board of County Commissioners 1995)

Most importantly, much of this increase is in census tracts that lie in the areas that could be considered as part of the wildland urban interface (See Figure 5). These tracts lie in the Hauser Lake, Spirit Lake and Hayden Lake areas, sites with steep terrain rising up from the lakes giving owners commanding views but placing their homes at risk. Likewise, areas to the south of the Spokane River have experienced the same level of development. While other tracts of the county may not have grown as rapidly, they have increased significantly over the past decade. The only slow growing or stable tracts are those lying in areas that were fully developed in 1990. Coupled with an ever increasing fuel load, this population and housing growth continues to place more and more people at risk.

Climate

Storms carrying from the Northern Pacific coupled with the higher terrain to the east of the county influence the climate of Kootenai County. Prevailing maritime air is lifted and cooled by the mountains producing precipitation throughout the county. Average annual precipitation can range from 25 inches in the lowlands to 70 inches in the mountains. The wettest months are November through January and the driest are June through September. Table 1 below demonstrates the monthly averages in temperature and precipitation over the past five years.

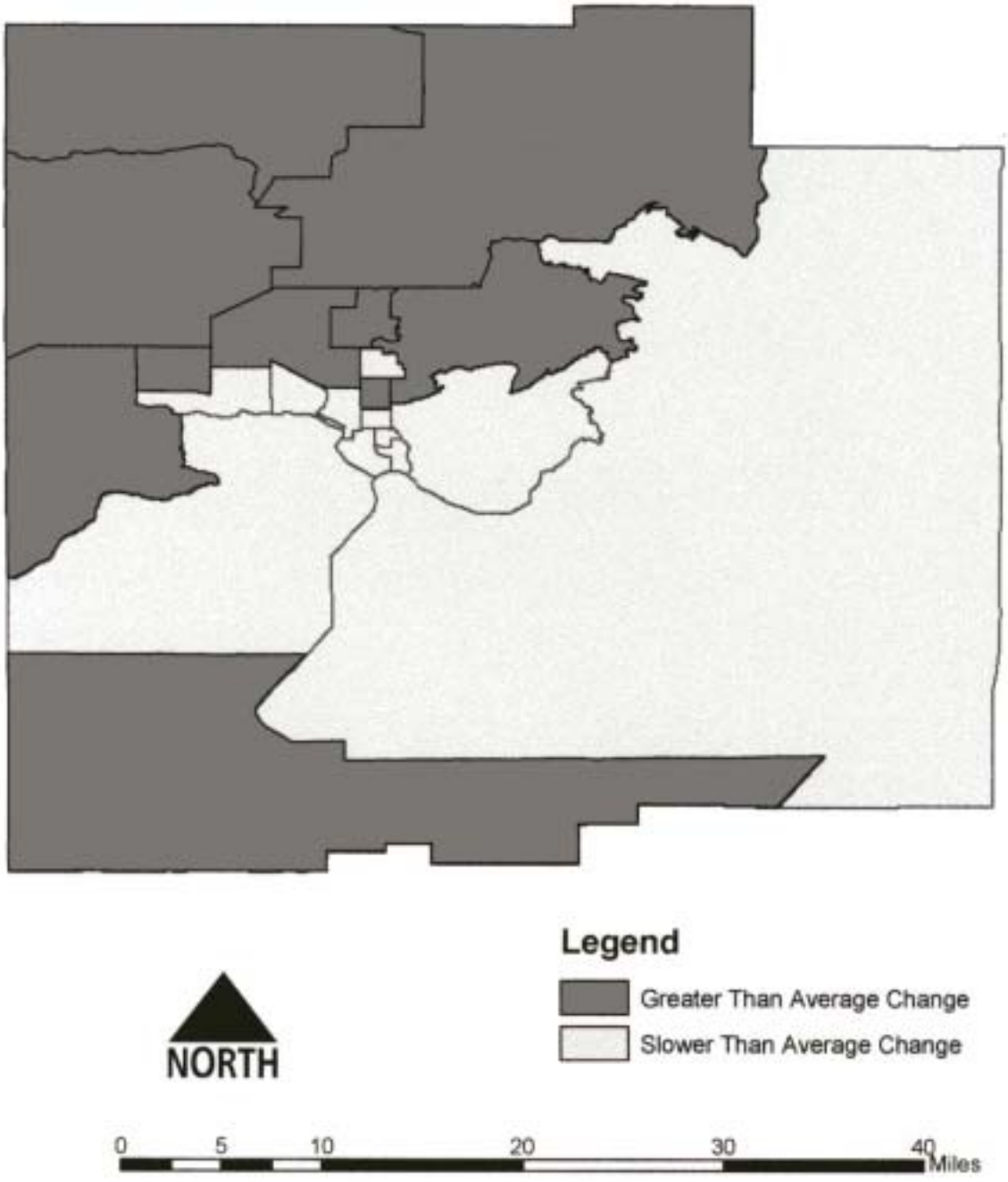


Figure 5 1990-2000 Fast Growing Census Tracts

The wet winters and springs give way to hot, dry summers and early falls. The fuel on the forest floors grows with the spring rains and then becomes more and more flammable later in the year. The wildfire season is usually in the late summer and early fall when fuels have dried and precipitation is low.

TABLE 1

MONTHLY AVERAGES 1997 - 2001			
	Maximum Temp.	Minimum Temp.	Total Precip.
MONTH	(°F)	(°F)	(in.)
January	36.8	25.8	4.2
February	41.0	27.1	2.9
March	48.5	30.9	2.3
April	55.9	35.0	2.1
May	65.6	43.6	2.6
June	71.2	49.5	1.7
July	81.8	56.0	0.9
August	84.4	56.4	0.7
September	74.8	48.4	0.9
October	58.3	38.1	2.2
November	45.9	32.2	3.3
December	36.5	26.2	3.5
Annual	58.1	38.8	26.3
Source: National Oceanic and Atmosperic Administration 2000			

Fire History

Wildfires are normally a natural ecological event that helps rejuvenate the forest by releasing seeds from pine cones or activating germination. However, as humans move into the forests to live, the risk to property and life increase and the potential for human caused fires increases. In fact, human activity is 7 times more likely to cause wildfires (see Table 2) below (U. S. Fire Administration 2000b).

The first wildland fire control program was established in 1885 (U. S. Fire Administration 2000b). Since that time the methods of control have varied from complete suppression to allowing some wildfires to burn as part of the natural forces. The changes in policy through the years have been a direct result of the variation in risk associated with humans living or recreating in these wildlands. Questions rise over two basic areas: suppression and reduction of fuels. Should homeowners be required to create survivable space and build with survivable materials or should fire fighters be required to attack fires in dangerous locations to save homes? Should fuels be reduced by controlled

burns or mechanical means? These questions lie at the core of the development of any wildland urban interface fire mitigation plan.

Table 2

10-Year National Average of Wildland Fire Causes (1988-97)

	Human Cause	Lightning Cause
Number of Fires	102,694	13,879
Percent of Fires	88	12
Acres Burned	1,942,106	2,110,810
Percentage of Acerage	48	52

Source: U. S. Fire Administration 2000b.

The Big Blowup of 1910

Historically, there have been three major wildland fires in North Idaho since European settlement. The first of these is the Big Blowup in August 1910 documented in Stephen Pyne's *Year of the Fires.* As Pyne notes, 1910 was a bad fire year across the country, but the fire in Northeastern Idaho and Western Montana was perhaps the most disastrous (Pyne 2001). More than 3,000,000 acres burned and 88 people died. Although the fire was primarily in adjoining Shoshone County, some acreage in Kootenai County was also involved. The City of Wallace was partially destroyed during this fire.

A dry spring and summer followed a normal winter in 1910. July was intensely hot with dry southwest winds (House 1996). On August 20, these southwest winds reached gale force resulting in a numerous small fires, both human and lightning created, fanned into one of the worst wildfires in the history of the country. It was during this fire that forest service employee Ed Pulaski saved the lives of many of his crew. He subsequently invented the wildland firefighter's primary tool, the Pulaski.

The Sundance Fire

1967 was one of the worst fire seasons on record with 59 days of very high or extreme fire danger. National forests were closed until September 11 (House 1996). Lightning started fires throughout the summer. For example, on July 12 there were 131 fires and 818 throughout August. Several fires began on Sundance Mountain near Coolin and Priest Lake at the end of August. Northeast winds began to blow at 60 miles per hour. Humidity was less than 35%. The winds then quickly shifted from the southwest and the fire on the mountain made a big run on September 1 consuming over 56,000 acres in a single day and night. Although this fire presented an enormous risk, property damage was not equivalent to the 1910 fire.

Firestorm 1991

A dry and warm summer and early fall helped set the stage for a fire in mid-October near Hauser Lake. By October 15, there had been no rain for 42 days (House 1996). Several small fires caused by downed power lines were fanned into a firestorm on the 16th. Neighboring Spokane County suffered the most damage with 92 wildfires consuming 35,000 acres and causing 2 deaths and $15 million in damage. (Barker 1996).

2000 Wildland Fire Season

The 2000 wildland fire season was the worst since 1910 (U. S. Fire Administration 2000a). 15 firefighters were killed. 7 million acres were burned and losses exceeded $10 billion dollars. Total suppression costs for all federal agencies in 2000 were $1,362,367,000, 4 times the average over the previous 7 years (National Interagency Fire Center 2002). Over 2 million of these acres were located in Central Idaho and Western Montana. At a western governors' meeting, the governors and Clinton administration officials agreed to lobby Congress for $2.8 billion for fire prevention. Thus, wildland fire prevention became a national priority. Included in these budgets were monies for prescribed burns as well as mechanical fuel treatment.

Recent Kootenai County Fire Statistics

The National Fire Incident Reporting System compiles information on types of fires by fire district. Table 3 below indicates the number of vegetation fires and forest or wildland fires from 1996 to those that have occurred until the time of this report in 2002. Note that forest or wildland were not carried separately from 1996 to 1999. Also, there may have been only one department reporting in the new version of the system in 1999. Although early years would indicate an ever increasing number of fires, the past three years suggest stabilization. Lightning causes 70% of the wildfires in the National Forest. Humans cause 70% of the wildfires in the wildland urban interface zone (Kootenai County 2001).

Table 3

FOREST/WILDLAND AND VEGETATIVE FIRES IN KOOTENAI COUNTY 1996-2002

Year	Vegetative Fire	Forest/Wildland Fire
1996	180	
1997	181	
1998	224	
1999	266	6
2000	161	21
2001	239	19
2002	11	3

Source: National Fire Incident Reporting System

Fire District Assessments and District Capabilities

During the planning process fire chiefs of all of the fire districts servicing Kootenai County were interviewed and asked to describe the problems they perceived in the wildland urban interface. They also suggested possible solutions many of which were used in the construction of the action plan. They identified possible potential hazards in their district and located them on a map. Finally, they summarized the capabilities of their districts in fighting wildland urban interface fires and listed their apparatus and equipment. Specific remarks are contained in Appendix B. Locations and types of hazards are described in Appendix C. The following is a summary of the problems identified by these fire chiefs.

Lack of adequate access to properties was the most frequently mentioned problem. First, nearly all private and some public roads provided only one means of access to structures in the wildland urban interface zone. In addition, many of these roads were not well maintained and substandard in width. Others were gated making them completely inaccessible.

Lack of adequate water supply was the next most frequent problem. Water systems were fragmented. Water supply on individual properties provided little support for fire suppression.

Another cluster of problems related to the density and location of land development. Subdivisions and individual homes were being built on steep slopes next to the county's lakes and on the hillsides with commanding views without thought to creating survivable space. The density of this development had also increased placing more homes and people at risk.

Public awareness of risk and ways to management this risk was weak. Very few homeowners took advantage of creating survivable space adjacent to their homes or used non-flammable building materials in the creation of these homes. Some form of concerted public education was needed to inform these folks of the danger.

Open burning, including parties and keggers, created potential ignition points for fires.

Finally, fuel treatment is a major problem. The 1996 Ice Storm increased the amount of dead fall as well as major tree diseases. However, homeowners were not clearing their properties and, thus, increasing the potential for wildfires.

Fuels

Wildfire depends upon vegetative fuels. This mix of native vegetation and the changes in that vegetation due to human activity create the resources for possible wildfire. Types of forest and grasslands vegetation have been classified into various fuel models. Anderson (1982) describes four major groups: grass and grass-dominated, chaparral and shrub

fields, timber litter and slash. These are further divided to create 13 different categories based on the characteristics in each group. Obviously, as the amount or height of each increases the potential for intensive fire rises. Of particular concern is when ground fuels burn intensively enough to ignite ladder fuels that help carry the fire upwards from the ground to the taller trees setting off the potential for a crown fire where the fire can spread rapidly through the forest given the intensity of the wind and other climatic conditions.

The fuel composition in Kootenai County is mixed varying from grasslands in the south and southwest to large timber stands in the Eastern half of the county. These vegetative types are represented in an ArcView map provided with the plan with each type identified and the representative fuel type noted and defined in Appendix D. Figure 6 is an overview of this map with the shaded areas representing various vegetation types representing over 70 types of vegetation. The variation in shading represents various types of vegetation and not the fuel model. Thus, light and dark are not indicative of potential for fire.

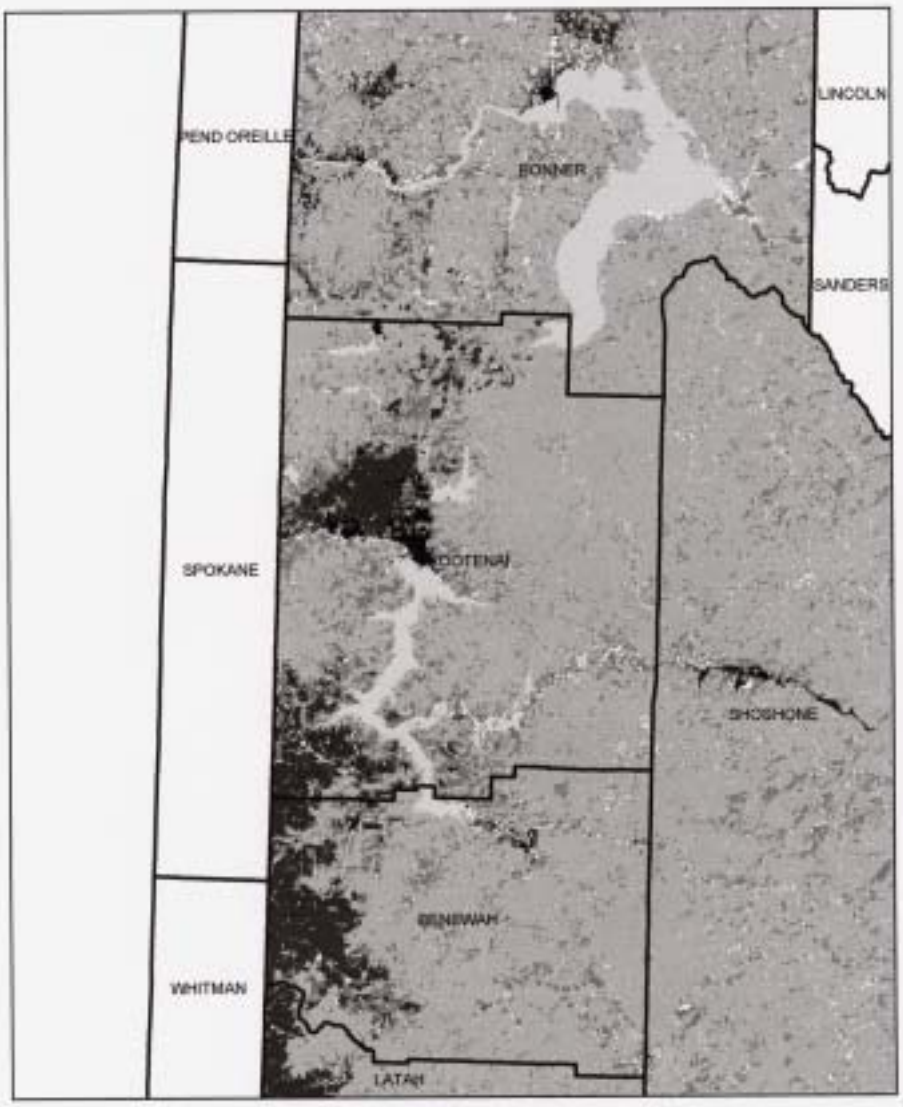
In those areas most prone to wildfires, human activity has changed the nature of the fuels in the region. Logging and disease have reduced the number of fire-tolerant species increasing the probability of wildfire. In addition, fire suppression has increased the amount of ground and ladder fuels within the region (Jerome 2001, 3). Utilizing ArcInfo and models of fire behavior, Jerome developed a fuel hazard model for the Coeur d'Alene River Ranger District of the Idaho Panhandle National Forest. Figure 7 is map of this region which includes Kootenai County. Fuel hazards in the county range from low to very high with the low hazard areas confined to the grassland prairies in the southwest and northwest. Higher risk areas are concentrated in the upland areas and along steep slopes next to the lakes and rivers of the county. Jerome warns that, given the scale of this study, it should not be used for site specific analysis but can be an aid in determining overall policy.

Risk Assessment

The accumulation of fuels in the forests of Kootenai County poses risks to those who inhabit the wildland urban interface zone. There are risks to resources as well, i.e., wildlife habitat, water, and timber resources. However, the focus of this plan is to reduce risk to people and homes. The following discusses several assessments of risks to property and life in the county: the National Fire Plan, the fire chiefs' and agency assessments, a U. S. Forest Service assessment, and the Jerome study noted in the previous section.

National Fire Plan

The National Fire Plan (www.fireplan.gov) identifies all of the major communities in Kootenai County as at risk communities. The risk was assessed by the cumulative information from those federal agencies dealing with wildland fire hazards. It



Fugure 6 Fuel Vegetation Types

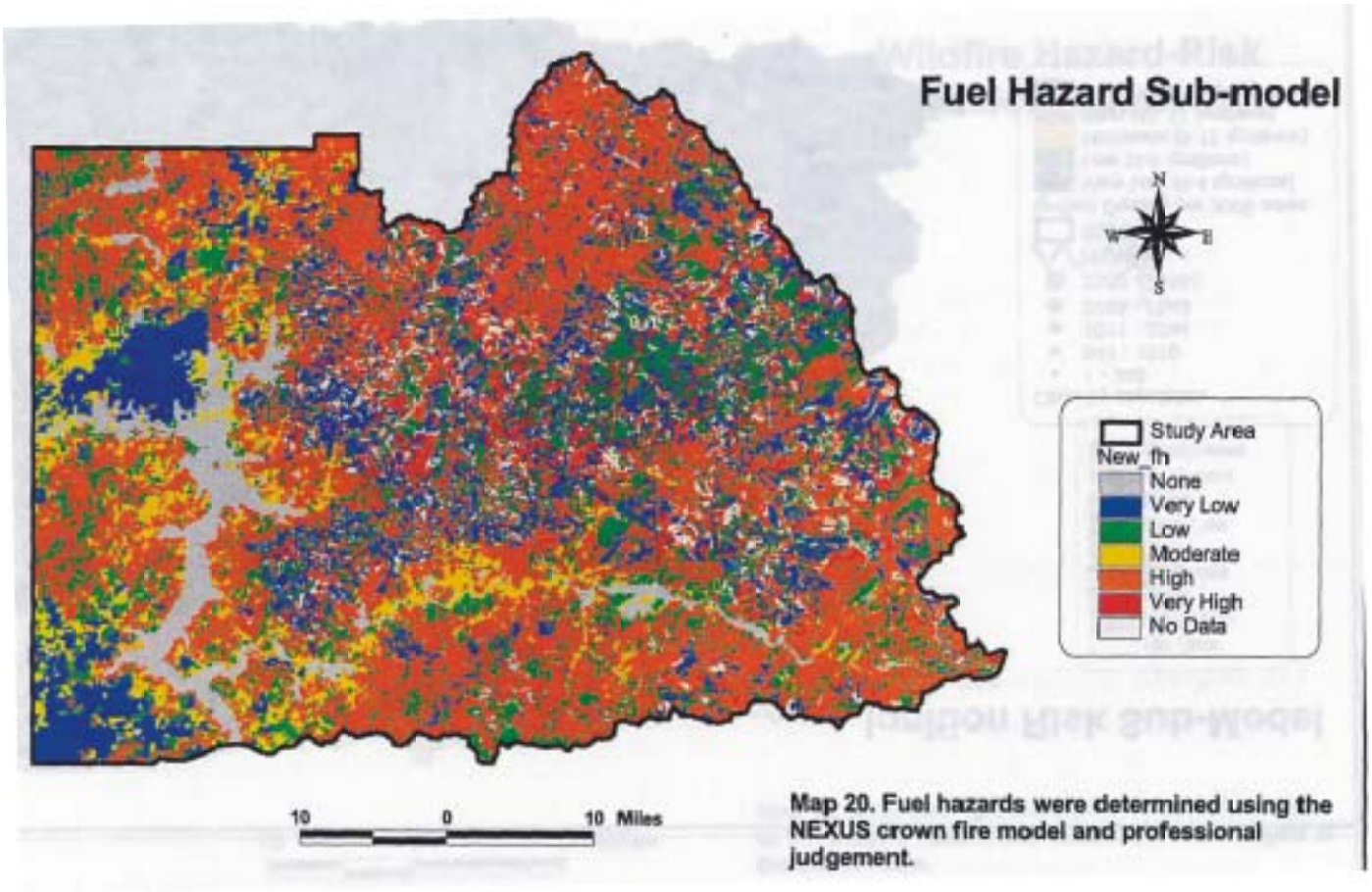


Figure 7 Fuel Hazards from Jerome (2001) by Permission of Author

is this fire plan that helps set the stage for providing for funds for hazardous fuels treatment in which the county is now participating. Although this is a broad brush stroke of assessment, it provides evidence that the county does, in deed. have a serious wildfire risk and that there is a threat to property and person.

U. S. Forest Service Risk Assessment

The U. S. Forest Service risk assessment was provided by their GIS laboratory in Kalispell, Montana. Figure 8 represents a portion of larger risk map generated by assessing several factors. The first of these included an assessment of the potential for fire within the region. Using the 2000 census data and estimating where people might live within each census tract, the Forest Service created a grid map allocating people and housing to locations within these tracts. This grid was then placed over the potentially dangerous crown fire zones to produce a map that assesses the risk to the population of the region.

The darkest areas of the map indicate the highest risk. Thus, although much of the eastern portion of the county north of Interstate 90 is in forest land, there are few inhabitants in this area and the risk is low. However, the risk is greater in the lower elevations nearest developing areas. This coincides with those census tracts that have seen the greatest growth over the last decade. These are also the areas most prone to ignitions caused by people rather than lightning. In addition, those areas of the county adjacent to the lakes and rivers are also at risk. These are places that are very attractive to people looking for recreational as well as permanent homes but are potentially hazardous due to the vegetation and steep slopes adjacent to these bodies of water.

Jerome Study

As noted in the fuels section above, Jerome studied wildfire risk within the region. Although the study covers the Coeur d'Alene River Ranger District of the Idaho Panhandle National Forests, it includes Kootenai County. Thus, while it is not possible to utilize statistics from this study, the map of human structures at risk resembles the larger Forest Service study. See Figure 9. The study indicates that most of the county is contained within high or very high risk zones particularly the lower altitude areas where development has occurred at a rapid pace over the last decade and along the water's edge.

Again as with the Forest Service study, much of this risk is predicated on the location of structures within the wildland urban interface area. The county has GIS records of the location of structures that was a major factor in the study. This structural location information is available in ArcView and is located on the county's ftp site (ftp://ftp.co.kootenai.id.us) and is included in the compact disk of maps included with this plan. The Jerome study maps were not available in ArcView but might be obtainable by contacting the author.

Fire Chiefs' and Local Agency Assessments

As note previously, interviews were conducted with the chiefs of the local fire districts and departments. During these interviews each was asked to identify specific hazards within their operational areas. Specific information on each site or sites is contained in Appendix C. These sites were identified by longitude and latitude on a GIS mapping system other than ArcView. The results are contained on the disks provided with the plan. Figure 10 represents a portion of the larger map zoomed to show the type information and is a general example of local district concerns: homes on steep slopes, inaccessible lake fronts and general home development in other inaccessible areas deep into the wildland urban interface. The chiefs also expressed concern about development in lowland areas in the northern portions of the county. Since the interface zone is very close to potential hazards in upland areas, a serious wildfire coupled with winds could spread easily to the more urbanized areas at lower elevations and on the valley floors where intense urbanization has occurred over the last decade. The Hauser Lake fire was a good indication of this potential.

Summary and Conclusions

All these assessments indicate that the potential for severe losses due to a potential wildfire is significant throughout much of the county. Most of the locations for these wildfires are located where the ignitions sources are human rather than natural. Thus, with ever increasing urban development, the potential for losses increases as well. Emphasis on fuel reduction can help reduce the hazard, but continued efforts to restrict development and increase standards for building and encouraging property owners to create survivable space in the wildland urban interface can also be effective in reducing disastrous losses.

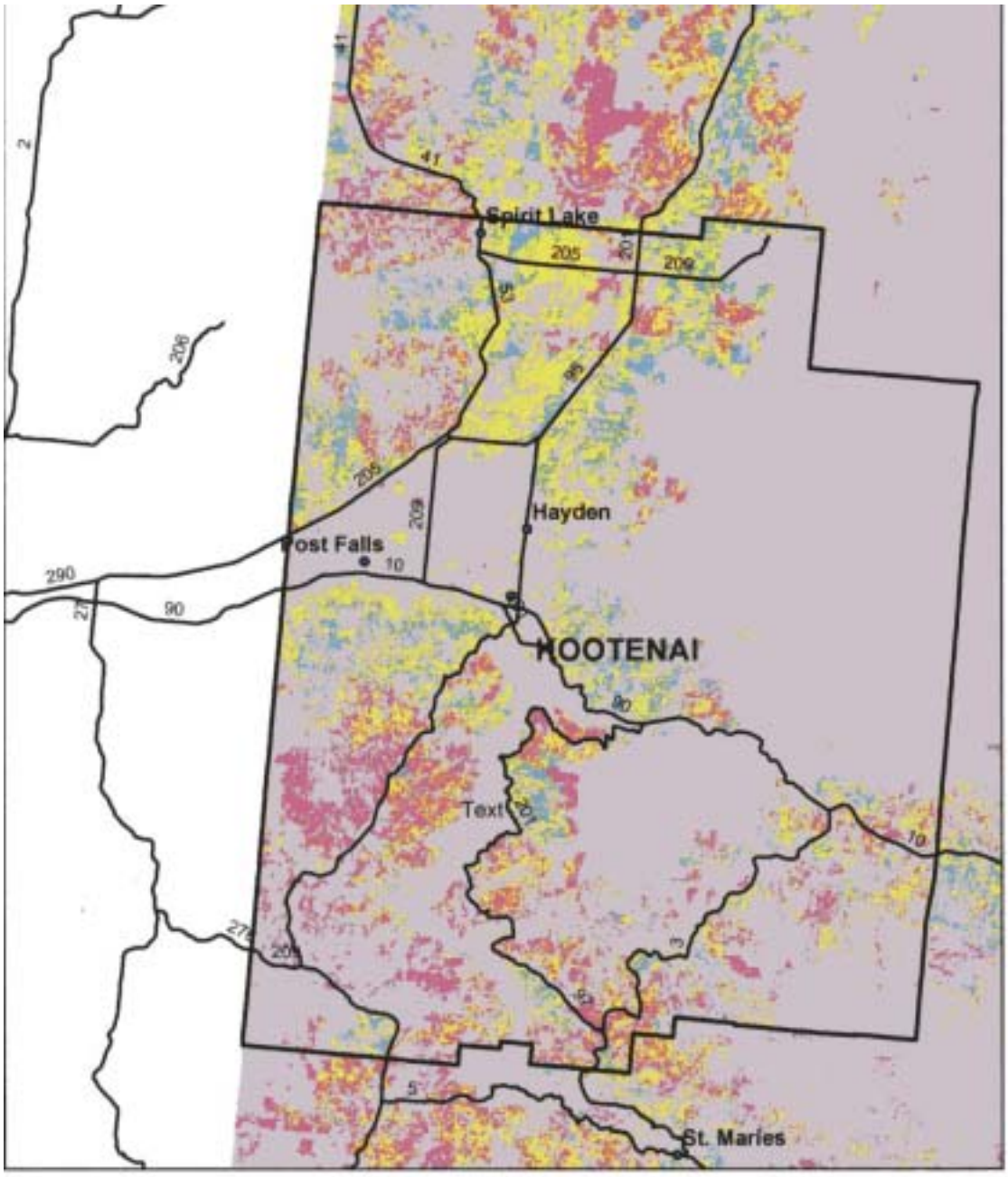


Figure 8 USFS Risk Map

Source: USFS GIS Kalispell, Montana

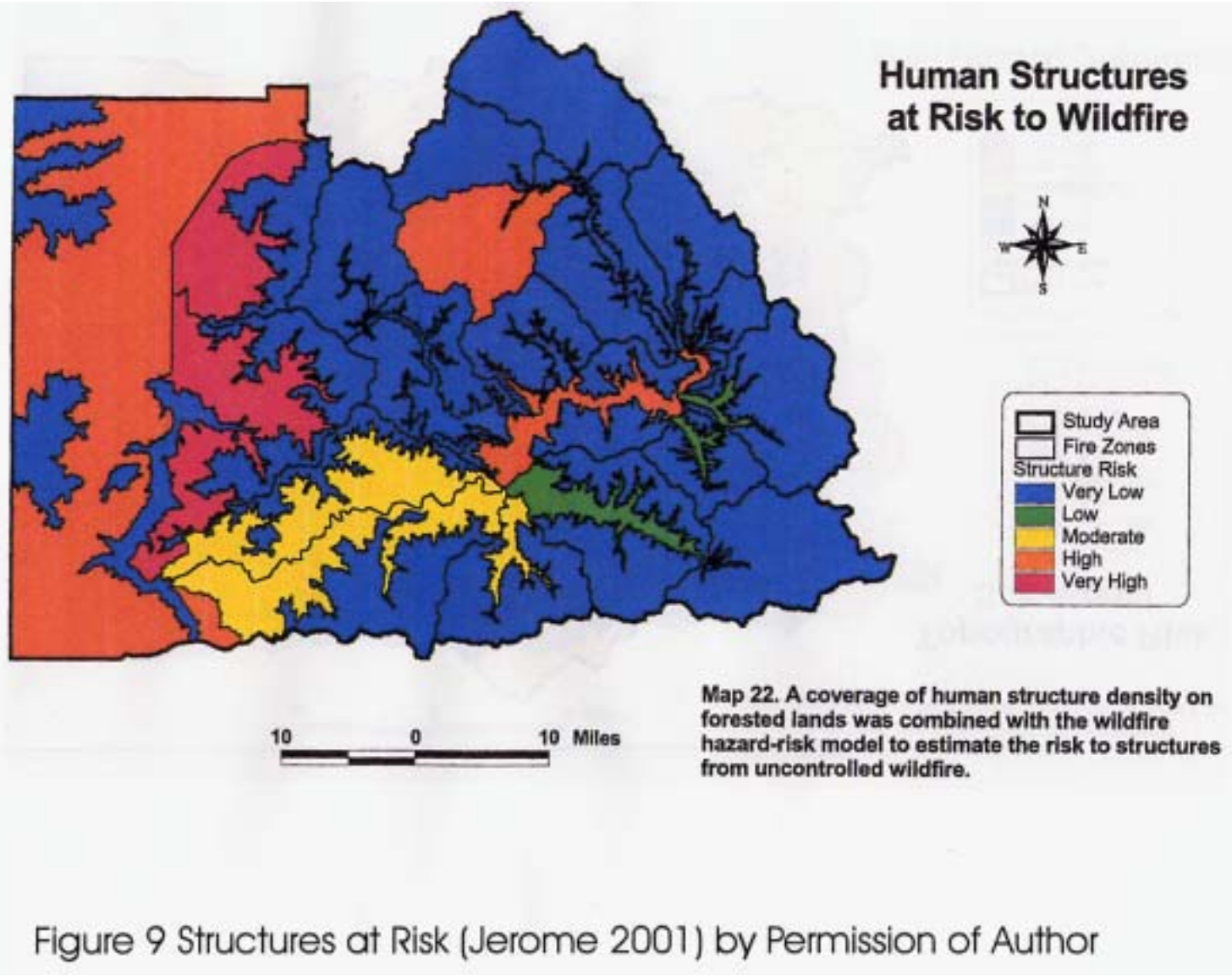


Figure 9 Structures at Risk (Jerome 2001) by Permission of Author

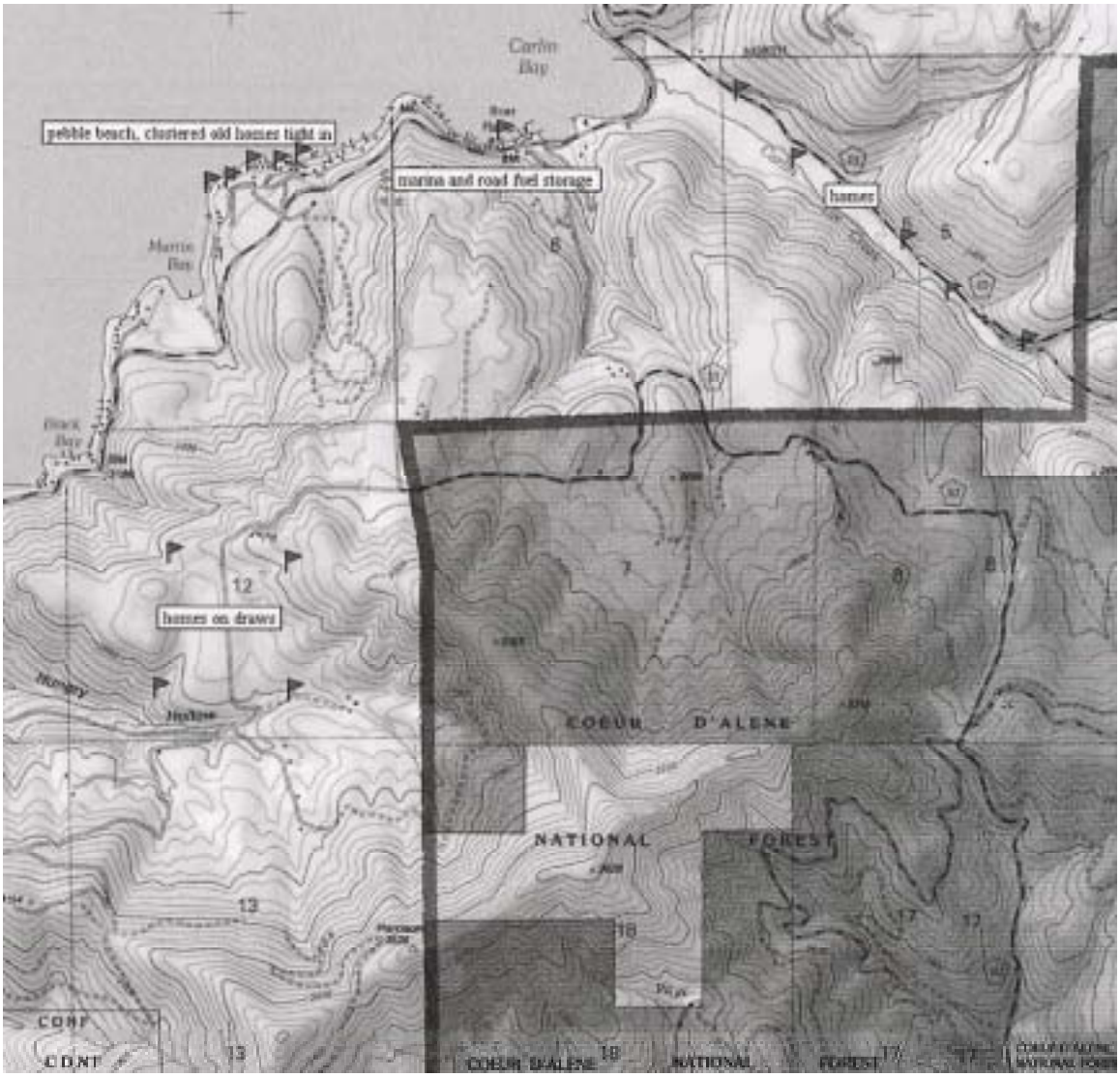


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Figure 10 Portion of Fire Chiefs' Map
No Scale